

## Conference papers

# Using three-channel video to evaluate the impact of the use of the computer on the patient-centredness of the general practice consultation

Alice Theadom BSc MSc  
Research Assistant

Simon de Lusignan MSc MBBS MRCPGP  
Senior Lecturer  
Primary Care Informatics, Department of Community Health Sciences, St George's Hospital Medical School, London, UK

Eben Wilson MA MCiM  
Media Company Director, Main Communications, Winchester, UK

Tom Chan RGN RMN BSc PhD  
Research and Development Manager, Surrey Hampshire Borders NHS Trust, Farnham Road Hospital, Guildford, UK

### ABSTRACT

The aim of this study was to assess the feasibility of using three-channel video to explore the impact of the computer on general practitioner (GP) consultations. A previous study had highlighted the limitations of using single-channel video: firstly, there was a lack of information about exactly how the computer was being used, and secondly difficulty in interpreting the body language of the consulting clinician. More information was needed to understand the impact of the computer on the consultation, and in this pilot three-channel video was used to overcome these constraints.

Four doctors consulted, with the patient's role played by an actor with a preset script and pre-loaded personal and family history record programmed into the computer. The output was analysed using the Roter Interaction Analysis

System (RIAS) and observational methods were used to explore the effect of computers on aspects of verbal and non-verbal behaviour and the completeness of the computer data record.

Three-channel video proved to be a feasible and valuable technique for the analysis of primary care GP consultations, with advantages over single-channel video. Interesting differences in non-verbal and verbal behaviour became apparent with different types of computer use during the consultation. Implications for the three-channel video technique for training, monitoring GP competence and providing feedback are discussed.

**Keywords:** body language, computer, consultations, video

## Introduction

This study set out to discover whether it was possible to use three-channel video output in a standard general practice consulting room, to collect sufficient information to assess the impact of the computer on

the patient-centredness of the consultation. An earlier study utilised single-channel video recordings to compare software with a standard clinical computer system.<sup>1</sup> However, there were important limitations in the use of single-channel video recordings. The video camera was positioned to capture the whole interaction between the clinician and patient in the frame,

making it difficult to analyse the finer details of the consultation, such as the clinician's facial expression and body language. In addition, it was extremely difficult to see either the software output or what the clinician was entering on the computer screen throughout the consultation. This made evaluation of the effect of the computer difficult, and gave very little information as to whether the clinician's input was appropriate.

It was concluded that three video channels were needed:

- one to look at the clinician's head and shoulders so that it was easy to observe body language
- one camera to look at the doctor–patient interaction
- a third channel to take the video output from the computer screen so that the use of the computer system can be assessed.

This paper reports the feasibility of using this three-channel technique within a standard consulting room.

## Background

### Use of computers in primary care consultations

The computer is now ubiquitous in the United Kingdom (UK) primary care consultation. The National Health Service (NHS) information strategy accelerated progress in this direction, stating that all practices should be computerised by 2005.<sup>2</sup> This strategy aimed to improve the quality of data recorded, drive evidence-based practice and enable easier audit of practice data to explore if national targets are being met. By 1995 it was reported that around 90% of general practitioners (GPs) were using computers during their consultations.<sup>3</sup> The new General Medical Services (GMS) contract, implemented in 2003, has quality targets that can only be met through the use of general practice computers to record markers of the quality of care.<sup>4</sup>

The computer can be used in different ways during a consultation. Fitter and Cruickshank have identified three patterns of computer use:<sup>5</sup>

- 1 *Minimal users*: clinicians who only record information at the end of the consultation after the patient has left. This has led to concerns of memory load affecting the completeness of the patient record and the final diagnosis.
- 2 *Conversational users*: clinicians who record information throughout the consultation, requiring the ability to alternate between tasks.
- 3 *Block users*: clinicians that interrupt the consultation to use the computer, often leaving the patient sitting quietly.

It is accepted that there remains a somewhat limited research base about effective ways to use the computer in the consultation.<sup>6</sup> Models have been proposed, but based on consensus and opinion rather than rigorous scientific method.<sup>1,7–9</sup> Much has been described about the use of the computer, but very little has been rigorously evaluated.<sup>3,10</sup>

### Impact on patient-centred care

Herzmark *et al.* observed how the computer screen requires more attention than paper.<sup>11</sup> Warshawsky concluded that GPs spent less time interacting with the patient,<sup>12</sup> and Pringle and Stewart-Evans reported that use of computers can lengthen the duration of the consultation.<sup>13</sup> It is possible that specific training that converts clinicians from conversational to block styles of computer use might improve the use of the computer in the consultation without prolonging it.<sup>14</sup> It is possible that specific training that converts clinicians from conversational to block styles of computer use or identifies communication skills that assist in maintaining rapport with the patient whilst using the computer in the consultation,<sup>15</sup> may improve the use of the computer in the consultation without prolonging it.<sup>14</sup> Ridsdale and Hudd have highlighted how patients wish to see some but not necessarily all of the information contained in their computer record,<sup>16</sup> but that generally they think favourably of doctors who use computers in the consultation.<sup>17</sup>

Aspects of non-verbal communication such as maintenance of eye contact and body posture, in addition to paying attention, asking questions and providing explanations, are important to patient satisfaction.<sup>18</sup> High levels of patient satisfaction are desirable, as more satisfied patients are associated with higher levels of adherence to treatment, understanding of their condition, adaptive coping, quality of life and health outcome.<sup>19,20</sup> However, these important elements of the doctor–patient interaction may be compromised if the GP is focused on the computer. Therefore an effective technique needs to be developed to identify and explore the balance between encouraging evidence-based practice and provision of high-quality patient-centred care.

### Use of video recordings in primary care consultations

The use of single-channel video recording during consultations has been widely researched. Evidence suggests that there is little impact on practitioner behaviour or patient satisfaction of consultations due to the presence of a video camera.<sup>21,22</sup> Video recordings have also been effectively used across many academic

fields for teaching and training purposes;<sup>23</sup> they are mandatory for the Summative Assessment of doctors wishing to enter general practice.<sup>24</sup>

## Assessment of patient-centred consultations

Patient characteristics have been found to significantly influence GP consultations, particularly verbal communication.<sup>20</sup> In addition, different illnesses place different demands on the patient and the GP's response. Therefore it would be difficult to analyse the effect of computer use on the consultation without a very large sample. The use of actors has been extensively used in training of GPs and may provide a valuable method of controlling for doctor, patient and illness characteristics that may mask the influence of computer use on the consultation.<sup>25</sup>

Mead *et al.* identified three distinct dimensions of a patient-centred consulting style: biopsychosocial perspective, sharing power, and responsibility and therapeutic alliance.<sup>25</sup> The most widely used measures of primary care consultations analyse the content of the verbal interaction between the doctor and the patient (where utterances are coded according to their meaning for aspects of the dimensions outlined above). The content across interactions and observational recordings can then be compared. However, non-verbal behaviours such as affirmative head nodding, gaze focused on the patient, leaning forward, affectionate touching and smiling have also been found to have an important influence on patients' perceptions of, and satisfaction with, the consultation.<sup>22</sup> Caris-Verhallen *et al.* used the duration of time the doctor engaged in each behaviour to represent the extent of these behaviours during an interaction.<sup>26</sup>

A shortcoming of the literature is that the recording of an adequate computer record is not part of the assessment. It appears that a clinician could ask the same question in 12 successive consultations as long as they do it in a patient-centred way.

## Method

### Technical procedure

Three separate video recordings were made simultaneously. One camera films from the 'conventional' position from which consultations are video-recorded (see Figure 1) to capture the doctor's and patient's interaction. Another faces towards the GP (see Figure 2) to capture non-verbal behaviour; the third channel takes a video feed from the computer screen, providing a real-time view of use of, and input to, the record by

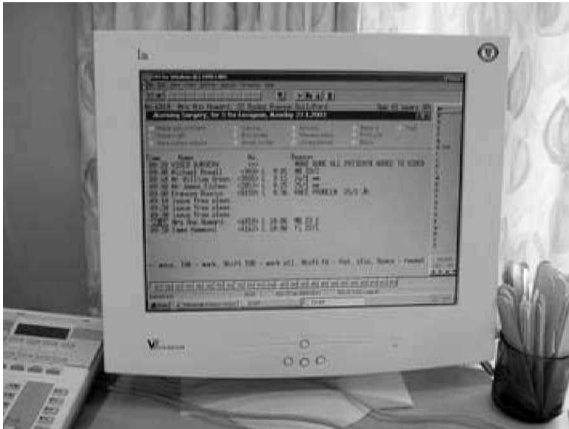


**Figure 1** Camera A, in the standard position used for video recording consultations recommended for Summative Assessment<sup>24</sup>

the GP (see Figure 3). All cameras were placed so that the examination couch was not in view of the camera, to ensure that physical examinations were not video-recorded. The video output was recorded onto professional video-recording machines, which allowed a precise matching of time sequences when the channels were mixed (see Figure 4). The separate video channels were then mixed in a commercial studio.



**Figure 2** Camera B, behind the patient looking at the doctor's face



**Figure 3** The video output from the clinical system; this is a video split image so that whatever keystrokes are used are captured in real time



**Figure 4** Professional standard video was used so that the time sequences in the videos were precisely matched; the tapes were 'mixed' together in a professional studio

## Experimental procedure

An actor was used to role-play standard cases to control for the effect of patient characteristics that have been found to influence the consultation.<sup>20</sup> The actor had had experience of patient role-play in medical student examinations. The actor was given a short script to learn and studied the preloaded history that had been placed in the clinical computer system, including information about them and their 'family'. Previous consultation notes were entered to give the clinical system as real a feel as possible.

The participants analysed in this pilot were four different general practitioners consulting with one patient (actor). The whole consultation was videoed with written consent from the GPs and the actor that the images would be used in research and might be published.

## Assessment measures of verbal and non-verbal behaviour

The Roter Interaction Analysis System (RIAS) was utilised to code verbal behaviour in the GP interaction.<sup>27</sup> Each utterance (either a word or sentence conveying one meaning from the GP and the patient) was coded from a list of 30 codes.<sup>27</sup> These were then clustered into five categories: social communication, affective communication, structural communication, health communication and lifestyle/psychosocial communication. The percentage of verbal communication that focused on each of these five categories was then calculated.

Observation was used by an independent rater [AT: experienced in the use of observational assessment] to measure non-verbal behaviour. The length of time the

GP focused their gaze towards the patient, nodded their head, smiled, leant towards the patient or touched the patient (not including the physical examination) was recorded and was divided by the total length of the consultation to provide the percentage of time each GP maintained that patient-centred behaviour.

## Data record

The completeness of the recorded data from the observed differences in the computer records between the different types of computer users was then compared.

## Results

### Technical results

The technical arrangements of the equipment were feasible and practical to employ. Two people set up the cameras and other equipment, in less than an hour, in a standard consulting room.

The three-channel video recordings successfully captured the GPs' facial and body language, the interaction between the doctor and the patient, and the computer output on the screen. Various mixes of the images were experimented with. The most acceptable format for the final video, which contained all three channels, was:

- a full screen image of the computer system
- the video footage from the two cameras overlaid in two small windows (see Figure 5).



**Figure 5** Final output selected for the layout of the three-channel video

The reason for this is that it became clear that parts of the screen are used little, and that it was important to be able to read what the GP was typing.

Experimental results

The RIAS and observational recordings are set out in Tables 1 and 2. Differences were observed in the verbal and non-verbal behaviours of GPs according to their

type of computer use. Exploratory analysis suggests that minimal users spent more time on affective communication with the patient in comparison to the other styles of computer use.<sup>5</sup> Analysis of variance (ANOVA) showed that this was significant at the  $P<0.05$  level. As expected, minimal users appeared to maintain their gaze in the direction of the patient, leaned towards the patient and smiled for longer than conversational or block users. No ‘affectionate touching’ took place during the consultations.

Data recordings

It became apparent that increased use of the computer did encourage evidence-based practice with higher users using the computer to seek information throughout the consultation in addition to recording data. However, at these times the GP’s posture was turned directly away from the patient, appearing to exclude the patient from that part of the interaction (see Figure 6). This is supported by the non-verbal behaviour observations.

When the doctors put off using the computer to the end of the consultation they made smaller clinical entries and coded less information. It became evident that the computer did act as a prompt and structured the consultation; for example, prompting the doctor to complete all aspects of the patient’s profile (height,

**Table 1** Percentage of utterances on different aspects of verbal communication after RIAS analysis

Consultation	Type of computer user	Health/medical	Social	Affective	Lifestyle/psychosocial	Structural	Other
A	Block	34.14%	18.29%	4.87%	10.97%	18.29%	13.41%
B	Minimal	43.75%	10.42%	13.54%	12.50%	15.63%	4.17%
C	Conversational	34.43%	32.79%	8.20%	19.67%	1.64%	3.28%
D	Minimal	45.12%	24.39%	13.41%	8.54%	7.32%	2.44%

**Table 2** Percentage of time spent engaging in patient-centred non-verbal behaviours

Consultation	Type of computer user	Looking at patient	Affirmative head nodding	Smiling	Leaning forward
A	Block	15.72%	3.23%	2.79%	0.86%
B	Minimal	75.34%	2.38%	18.29%	0.79%
C	Conversational	8.68%	3.02%	6.42%	3.96%
D	Minimal	56.46%	3.94%	8.28%	24.85%



**Figure 6** Showing the degree of interruption to the consultation from the use of the computer

weight, lifestyle habits and so on). The consultation flowed more logically and provided a more complete dataset as a result.

A general observation was made about the detailed level of feedback that could be provided using this technique compared with conventional single-channel video.

The results suggest that computer use was inversely related to the patient-centredness of the consultation.

## Discussion

The technical set-up was effective and worked without a problem in the consulting room. This enabled the analysis of many aspects of the consultation, such as data recording and interaction, to be conducted simultaneously. The technique allows very detailed feedback about the consultation process and the use of the computer. The use of the computer did detract from the patient-centred tone of the consultation, highlighting that there is a trade-off between patient-centred care and creating an adequate electronic record and proving evidence-based care.

Some interesting patterns from the observations emerged, although due to the small sample size it is unclear if these differences are truly significant. It could be these differences are just due to the different

personal styles of the GPs studied, rather than due to the use of the computer. However, they are very consistent with the findings reported by Herzmark,<sup>11</sup> Warshawsky,<sup>12</sup> and Mitchell and Sullivan.<sup>10</sup>

The measures of the verbal and non-verbal behaviours are based purely on subjective observation and coding. These measures also do not fully map with the three distinct dimensions of patient-centred consulting identified by Mead *et al.*<sup>25</sup> An objective measure of non-verbal behaviour during interactions is needed.

The need for an effective assessment tool to analyse videos and inform best practice has been recognised for a long time.<sup>23,28</sup> The three-channel video set-up, when combined with the use of actors, enables the components of the consultation (the patient and their history and the past computer record) to be controlled. Thus what is recorded during this simulated consultation in the computer record represents an integration of all the available information by the consulting GP. This could provide a mechanism that could be used for assessment in a number of circumstances:

- The assessment of 'remedial' doctors:<sup>29</sup> their ability to integrate the information given by the patient, contained within the medical history in the computer, and their own body of knowledge. The combination of three channels allows a very detailed feedback to be given.
- To compare different general practice computerised medical record systems against a model of the ideal consultation.
- To provide training about when and how to use the computer in the consultation so that it has least impact on patient-centredness; for example, how to position the computer screen so that this can also be seen by the patient to increase their involvement in the consultation and decision-making process.<sup>6</sup>

The three-channel approach enables the computer record to be studied simultaneously to the interaction so that all-important aspects of the GP consultation and GP competence can be explored. The extra time taken for a GP to clinically code information on the patient record has been quantified using video. A UK study with special coding software suggested it took 30 seconds per item,<sup>30</sup> and another using a different software, but in a secondary care setting, suggested 40 seconds was the norm.<sup>31</sup> It would have been possible to measure the time taken for GPs to code information using three-channel video and to compare the number of items coded by each clinician, and the proportion of the consultation taken up by the coding process.

In addition, a larger experiment with a larger sample of 'patients', doctors and nurses is needed to confirm this pilot study's findings. Also, a comparative study of the different GP computer systems would be useful to tease out their strengths and weaknesses.

The micro-details of the human-computer interface should also be studied, including careful consideration of the patient's reaction to certain situations in the consultation; for example, the difficulty in using certain codes or the patient's reactions when the 'interaction warning' appears when prescribing.

## Conclusions

There appears to be a trade-off between maintaining a patient-centred tone in the consultation and utilising the functionality offered by the computer. Achieving a high-quality medical record may be at the expense of patient-centredness.

## ACKNOWLEDGEMENTS

The authors would like to thank Professor Abdol Tavabie, Dr Peter Bower and the members of Kent, Surrey and Sussex Primary Care Research Network (KSSnet) for their valuable comments about the video produced as part of this study.

## FUNDING

KSSnet (in turn funded by NHS R&D) supported the project.

## REFERENCES

- de Lusignan S, Wells S and Russell C. A model for patient-centred nurse consulting in primary care. *British Journal of Nursing* 2003;12(2):85–90.
- Burns F. *Information for Health: an information strategy for a modern NHS, 1998–2000. A National Strategy for Local Implementation*. Leeds: NHS Executive, 1998.
- Sullivan F and Mitchell E. Has general practitioner computing made a difference to patient care? A systematic review of published reports. *British Medical Journal* 1995;311:848–52.
- NHS Confederation GMS Contract Negotiations: [www.nhsconfed.webhoster.co.uk/gmscontract/](http://www.nhsconfed.webhoster.co.uk/gmscontract/)
- Fitter MJ and Cruickshank PJ. The computer in the consulting room: a psychological framework. *Behaviour and Information Technology* 1983;1:81–92.
- Birgitte A. The desk top computer as a magic box: patterns of behaviour connected with the desk top computers. GPs' and patients' perceptions. *Family Practice* 1997;14(1):17–23.
- Kurtz SM, Silverman JD, Benson J and Draper J. *The Enhanced Cambridge–Calgary Guide to the Medical Interview*: [www.skillscascade.com/handouts/ENHANCEDCalgarycambridge.pdf](http://www.skillscascade.com/handouts/ENHANCEDCalgarycambridge.pdf)
- Wellclose Square Surgery. *Using the Computer in the Consulting Room CD-ROM*: [www.wellclosesquare.co.uk/training/iicr/cdrom.htm](http://www.wellclosesquare.co.uk/training/iicr/cdrom.htm)
- University of Newcastle, Sowerby Centre for Health Informatics. *Using the Computer in the Consulting Room*: [www.prodigy.nhs.uk/Training/UCCR.asp](http://www.prodigy.nhs.uk/Training/UCCR.asp)
- Mitchell E and Sullivan F. A descriptive feast but an evaluative famine: systematic review of published articles on primary care computing during 1980–97. *British Medical Journal* 2001;322:279–82.
- Herzmark GA, Brownbridge G, Fitter M and Evans A. Consultation use of a computer by general practitioners. *Journal of the Royal College of General Practitioners* 1984;34:649–54.
- Warshawsky S. General practitioner records on computer. *Family Practice* 1993;10:474.
- Pringle M and Stewart-Evans C. Does awareness of being video-recorded affect doctors' consultation behaviour? *British Journal of General Practice* 1990;40:455–8.
- Warshawsky SS, Pliskin JS, Urkin J *et al*. Physician use of a computerized medical record system during the patient encounter: a descriptive study. *Computer Methods and Programs in Biomedicine* 1994;43:269–73.
- Booth N, Kohannejad J and Robinson P. *Information in the Consulting Room (iiCR) Final Project Report 2002*. Newcastle upon Tyne: University of Newcastle upon Tyne, 2002. [www.schin.ncl.ac.uk/iiCR/final\\_report.asp](http://www.schin.ncl.ac.uk/iiCR/final_report.asp)
- Ridsdale L and Hudd S. What do patients want and not want to see about themselves on the computer screen: a qualitative study. *Scandinavian Journal of Primary Health Care* 1997;15:180–3.
- Ridsdale L and Hudd S. Computers in the consultation: the patient's view. *British Journal of General Practice* 1994;44:367–9.
- Cruickshank PJ. Patient rating of doctors using computers. *Social Science & Medicine* 1985;21:615–22.
- Salmon P. *Psychology of Medicine and Surgery: a guide for psychologists, counsellors, nurses and doctors*. Chichester: Wiley Press, 2000.
- Ong LML, De Haes JCJM, Hoos AM and Lammes FB. Doctor–patient communication: a review of the literature. *Social Science & Medicine* 1995;40:903–18.
- Heintzman M, Leathers DG, Parrott RL and Cairns FB. Non-verbal rapport-building behaviours: effect on perceptions of a supervisor. *Management Communication Quarterly* 1993;7:181–208.
- Campbell LM, Sullivan F and Murray TS. In: Weingarten MA, Yape J, Blumenthal D, Oren M and Margalit A. A comparison of videotape and audiotape assessment of patient-centredness in family physicians' consultations. *Patient Education & Counseling* 2001;45:107–10.
- Coleman T. Using video-recorded consultations for research in primary care: advantages and limitations. *Family Practice* 2000;17:422–7.
- National Office for Summative Assessment. *The COGPED Video*: [www.nosa.org.uk/information/video/cogped/guidelines.htm](http://www.nosa.org.uk/information/video/cogped/guidelines.htm)
- Mead N, Bower P and Hann M. The impact of general practitioners' patient-centredness on patients' post-consultation satisfaction and enablement. *Social Science & Medicine* 2002;55:283–99.
- Caris-Verhallen WCM, de Gruijter IM, Kerkstra A and Bensing JM. Factors related to nurse communication with elderly people. *Journal of Advanced Nursing* 1999;30:1106–17.

- 27 Roter D. *The Roter Method of Interaction Process Analysis*: [www.rias.org/manual.html](http://www.rias.org/manual.html)
- 28 de Lusignan S, Wells SE, Russell C, Bevington WP and Arrowsmith P. Development of an assessment tool to measure the influence of clinical software on the delivery of high-quality consultations. A study comparing two computerised medical record systems in a nurse-run heart clinic in a general practice system. *Medical Informatics* 2002;27:267–80.
- 29 Bahrami J and Evans A. Underperforming doctors in general practice: survey of referrals to UK deaneries. *British Journal of General Practice* 2001;51:892–7.
- 30 Brown PJ, Warmington V, Laurence M and Prevost AT. Randomised crossover trial comparing the performance of clinical terms version 3 and Read codes 5 byte set coding schemes in general practice. *British Medical Journal* 2003; 326:1127.
- 31 Cimino JJ, Patel VL and Kushniruk AW. Studying the human–computer–terminology interface. *Journal of the American Medical Informatics Association* 2001;8:163–73.

#### ADDRESS FOR CORRESPONDENCE

Simon de Lusignan MSc MBBS MRCP  
Senior Lecturer  
Primary Care Informatics  
Department of Community Health Sciences  
Hunter Wing  
St George's Hospital Medical School  
London SW17 0RE  
Tel: +44 (0)20 8725 5661  
Fax: +44 (0)20 8767 7697  
Email: slusigna@sghms.ac.uk

*Accepted August 2003*